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EXAMINER	
ZERVIGON, RUDY	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/052,703	KANG ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 February 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-8,11-19,21-27,32-37 and 41-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-8,11-19,21-27,32-37 and 41-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 28, 2008 has been entered.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 2-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie; Kuniaki et al. (US 6132512 A). Horie teaches:

i. Horie teaches a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) for supplying a reaction gas to a wafer (W; Figure 7) in a process chamber (1; Figure 7; column 7, lines 1-40), the shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) comprising circular plates (31,32; Figure 12b; column 11, lines 4-40), each of the circular plates (31,32; Figure 12b; column 11, lines 4-40) arranged substantially parallel to each other in a vertically stacked arrangement, each of the circular plates (31,32; Figure 12b; column 11, lines 4-40) having substantially the same diameter, each of the circular plates (31,32; Figure 12b; column 11, lines 4-40) including gas paths ("C"; Figure 12b; 24; Figure 10) for supplying a reaction gas to the process chamber (1; Figure

7; column 7, lines 1-40), wherein a gap ("D"; Figure 12b) exists between central regions of adjacent ones of the circular plates (31,32; Figure 12b; column 11, lines 4-40), wherein a gas path ("C"; Figure 12b) included one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) and a gas path ("C"; Figure 12b) included in another of the plates (31,32; Figure 12b; column 11, lines 4-40) are in fluid communication with each other via the gap ("D"; Figure 12b), and wherein a lowermost one (32) of the circular plates (31,32; Figure 12b; column 11, lines 4-40) includes cooling lines (B'; Figure 12b), coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), each of the cooling lines (B'; Figure 12b) connecting one of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) to one of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), the shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) further comprising: a first outer cooling line (D; Figure 12C) arranged outside the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) connecting the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45); and a second outer cooling line (other D after 26; Figure 12C) arranged outside the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) connecting the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) - claim 8. Applicant's claim requirement of "cooling" is a claim requirement of intended use in thepending appartus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP

2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

ii. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) including a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) that consists of a first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) arranged along the first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged along the second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), the cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that they are parallel to one another, as claimed by claim 4

iii. the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along the circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) such that the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are arranged in pairs

consisting of one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45), an angular spacing between the one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) of each pair less than the angular spacing between the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and an angular spacing between the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) - claim 5

Horie does not teach:

i. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40), the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) arranged such that each coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) is separated from an adjacent coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) by an angular spacing that is substantially equal to 360 degrees divided by a total number of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged such that lines drawn from each of the outlets to a radial center of the lower (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) divide the lower (32; Figure

12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) into substantially equal parts, as claimed by claim 2

ii. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 2, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) consisting of four coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) consisting of four coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), the cooling lines (B,B'; Figure 10; column 10, lines 21-45) consisting of four cooling lines (B,B'; Figure 10; column 10, lines 21-45), as claimed by claim 3

iii. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 3, the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that a path of each of the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) within the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) forms two legs of a right triangle, as claimed by claim 6

iv. The shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) of claim 8, the lowermost (32; Figure 12b; column 11, lines 4-40) one of the circular plates (31,32; Figure 12b; column 11, lines 4-40) including a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) that consists of a first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), wherein a total number of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a total number of coolant outlets

(25c1,c2,c3; Figure 10; column 10, lines 21-45) are both even numbers, half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged along the first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45), the other half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the other half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged along the second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), the cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that they are parallel to one another, as claimed by claim 7

It would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions.

Motivation to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions is to optimize the heat transfer of Horie's showerhead (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) as taught by Horie (column 2; lines 38-54). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). Additonally, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

4. Claims 11-19, 21-27, 32-37, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie; Kuniaki et al. (US 6132512 A) in view of Tomoyasu; Masayuki et al. (US 6544380 B2). Horie is discussed above. Horie further teaches:

i. the heater stage (3,4; Figure 7; column 7, lines 1-40) configured to have an adjustable height (17, 18; Figure 7) within the process chamber (1; Figure 7; column 7, lines 1-40), a bottom of the heater stage (3,4; Figure 7; column 7, lines 1-40) configured to contact an upper surface of the separating device (not numbered; Figure 7 - elements immediately above 17) at a lower position of the heater stage (3,4; Figure 7; column 7, lines 1-40), wherein a position of the separating device (not numbered; Figure 7 - elements immediately above 17) remains fixed relative to the process chamber (1; Figure 7; column 7, lines 1-40) – claim 11

ii. wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is configured to separate the heater stage (3,4; Figure 7; column 7, lines 1-40) and the process chamber (1; Figure 7; column 7, lines 1-40) by a uniform distance – claim 12

iii. The apparatus (Figure 7; column 7, lines 1-40) of claim 19, further comprising: a shaft (not numbered; Figure 7) installed beneath the heater stage (3,4; Figure 7; column 7, lines 1-40) and configured to raise and lower the heater stage (3,4; Figure 7; column 7, lines 1-40); and a shaft introduction portion (17, 18; Figure 7) configured to introduce the shaft (not numbered; Figure 7) at the bottom of the process chamber (1; Figure 7; column 7, lines 1-40), as claimed by claim 17

iv. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, the plurality of plates (31,32; Figure 12b; column 11, lines 4-40) substantially circular in shape and having

substantially the same diameter, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower plate (32; Figure 12b; column 11, lines 4-40), the circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) consisting of a first semicircular edge (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular edge (25c1,c2,c3; Figure 10; column 10, lines 21-45) that together form a circle, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) disposed along the first semicircular edge (25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along the second semicircular edge (25c1,c2,c3; Figure 10; column 10, lines 21-45), and the inner cooling lines (B,B'; Figure 10; column 10, lines 21-45) disposed parallel to each other, as claimed by claim 23

v. The apparatus (Figure 7; column 7, lines 1-40) of claim 21, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along the circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower plate (32; Figure 12b; column 11, lines 4-40) such that the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are arranged in pairs consisting of one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45), an angular spacing between the one coolant inlet (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the

one coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) of each pair less than an angular spacing between the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and an angular spacing between the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), as claimed by claim 24

vi. The apparatus (Figure 7; column 7, lines 1-40) of claim 22, the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) arranged such that a path of each of the four cooling lines (B,B'; Figure 10; column 10, lines 21-45) within the lower plate (32; Figure 12b; column 11, lines 4-40) consists of two straight lines that intersect at a right angle, as claimed by claim 25

vii. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, further comprising: a shaft (not numbered; Figure 7) configured to raise and lower the heater stage (3,4; Figure 7; column 7, lines 1-40), said shaft (not numbered; Figure 7) arranged beneath the heater stage (3,4; Figure 7; column 7, lines 1-40); and a shaft introduction portion (17, 18; Figure 7) configured to contain the shaft (not numbered; Figure 7) at the bottom of the process chamber (1; Figure 7; column 7, lines 1-40), as claimed by claim 35

viii. the process chamber (1; Figure 7; column 7, lines 1-40) having a bottom wall (17, Figure 7; column 7, lines 1-40) that defines a lower boundary of the process chamber (1; Figure 7; column 7, lines 1-40), the separating device (not numbered; Figure 7 - elements immediately above 17) disposed such that a bottom surface of the separating device (not numbered; Figure 7 - elements immediately above 17) is in physical contact with the bottom wall (17, Figure 7; column 7, lines 1-40) of the process chamber (1; Figure 7; column 7, lines 1-40) – claim 41

Horie does not teach:

i. An apparatus (Figure 7; column 7, lines 1-40) for forming a thin film, said apparatus (Figure 7; column 7, lines 1-40) comprising: a process chamber (1; Figure 7; column 7, lines 1-40) having a bottom wall (17, Figure 7; column 7, lines 1-40) that defines a lower-most boundary of the process chamber (1; Figure 7; column 7, lines 1-40); a heater stage (3,4; Figure 7; column 7, lines 1-40) disposed within the process chamber (1; Figure 7; column 7, lines 1-40) and entirely above the bottom wall (17, Figure 7; column 7, lines 1-40), the heater stage (3,4; Figure 7; column 7, lines 1-40) configured to support a wafer (W; Figure 7) and to heat the wafer (W; Figure 7) to a high temperature; a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) disposed above the heater stage (3,4; Figure 7; column 7, lines 1-40), the shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) configured to supply a reaction gas to the wafer (W; Figure 7); a separating device (not numbered; Figure 7 - elements immediately above 17) disposed beneath the heater stage (3,4; Figure 7; column 7, lines 1-40), a lower surface of the separating device (not numbered; Figure 7 - elements immediately above 17) disposed in contact with the bottom wall (17, Figure 7; column 7, lines 1-40), the separating device (not numbered; Figure 7 - elements immediately above 17) configured to separate the heater stage (3,4; Figure 7; column 7, lines 1-40) from the bottom wall (17, Figure 7; column 7, lines 1-40) and to reduce a volume of processing space within the process chamber (1; Figure 7; column 7, lines 1-40): and a process chamber (1; Figure 7; column 7, lines 1-40) cooling system configured to cool a bottom surface of the process chamber

(1; Figure 7; column 7, lines 1-40) whereon the separating device (not numbered; Figure 7 - elements immediately above 17) is located, as claimed by claim 19

ii. The apparatus (Figure 7; column 7, lines 1-40) of claim 12, wherein the heater stage (3,4; Figure 7; column 7, lines 1-40) and the process chamber (1; Figure 7; column 7, lines 1-40) are separated by about 2 to about 10 cm, as claimed by claim 13

iii. The apparatus (Figure 7; column 7, lines 1-40) of claim 19, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) comprises a heat-resistant material, as claimed by claim 14

iv. The apparatus (Figure 7; column 7, lines 1-40) of claim 14, wherein the heat-resistant material is a ceramic material, as claimed by claim 15

v. The apparatus (Figure 7; column 7, lines 1-40) of claim 11, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is ring shaped, the upper surface of the separating device (not numbered; Figure 7 - elements immediately above 17) configured to abut a lower surface of the heater stage (3,4; Figure 7; column 7, lines 1-40), a substantial portion of the upper surface of the separating device (not numbered; Figure 7 - elements immediately above 17) disposed directly beneath the lower surface of the heater stage (3,4; Figure 7; column 7, lines 1-40), as claimed by claim 16

vi. The apparatus (Figure 7; column 7, lines 1-40) of claim 17, wherein the shaft introduction portion (17, 18; Figure 7) is formed as a flexible bellows and has a length that varies as the shaft (not numbered; Figure 7) is raised and lowered, as claimed by claim 18

vii. An apparatus (Figure 7; column 7, lines 1-40) for forming a thin film, said apparatus (Figure 7; column 7, lines 1-40) comprising: a process chamber (1; Figure 7; column 7,

lines 1-40): a heater stage (3,4; Figure 7; column 7, lines 1-40) arranged in a lower (32; Figure 12b; column 11, lines 4-40) portion of the process chamber (1; Figure 7; column 7, lines 1-40) and configured to support a wafer (W; Figure 7) and to heat the wafer (W; Figure 7) to a high temperature; a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) disposed in an upper portion of the process chamber (1; Figure 7; column 7, lines 1-40) and configured to supplying a reaction gas to the wafer (W; Figure 7), said shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) comprising a plurality of plates (31,32; Figure 12b; column 11, lines 4-40) having a plurality of gas paths ("C"; Figure 12b; 24; Figure 10) formed therein and a shower head (5; Figure 7; 20; Figure 10,12b; column 10, lines 21-43) cooling system arranged in a lowermost one of the plurality of plates (32; Figure 12b; column 11, lines 4-40); said cooling system comprising a plurality of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45), a plurality of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), and a plurality of independent inner cooling lines (B,B'; Figure 10; column 10, lines 21-45) for connecting each of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) to one of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45); a separating device (not numbered; Figure 7 - elements immediately above 17) arranged between the process chamber (1; Figure 7; column 7, lines 1-40) and the heater stage (3,4; Figure 7; column 7, lines 1-40), the separating device (not numbered; Figure 7 - elements immediately above 17) arranged to separate the heater stage (3,4; Figure 7; column 7, lines 1-40) and a bottom of the process chamber (1; Figure 7; column 7, lines 1-40) by a substantially uniform amount, the substantially uniform amount in the range of about 2 to

about 10 cm a first outer cooling line (D; Figure 12C) located outside the lowermost one of the plurality of plates (32; Figure 12b; column 11, lines 4-40) and configured to connect the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45); and a second outer cooling line (other D after 26; Figure 12C) located outside the lowermost one of the plurality of plates (32; Figure 12b; column 11, lines 4-40) and configured to connect the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), as claimed by claim 27

viii. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, the plurality of plates (31,32; Figure 12b; column 11, lines 4-40) substantially circular in shape and having substantially the same diameter, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) disposed along a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) of the lower plate (32; Figure 12b; column 11, lines 4-40), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) arranged such that each coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) is separated from a nearest adjacent coolant outlet (25c1,c2,c3; Figure 10; column 10, lines 21-45) by an angular spacing that is substantially equal to 360 degrees divided by a total number of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) arranged such that lines drawn from each of the inlets to a radial center of the lower-most plate divide the lower plate (32; Figure 12b; column 11, lines 4-40) into substantially equal parts, as claimed by claim 21

ix. The apparatus (Figure 7; column 7, lines 1-40) of claim 21, the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) consisting of four coolant inlets

(25b1,b2,b3; Figure 10; column 10, lines 21-45), the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) consisting of four coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45), and the inner cooling lines (B,B'; Figure 10; column 10, lines 21-45) consisting of four inner cooling lines (B,B'; Figure 10; column 10, lines 21-45), as claimed by claim 22

x. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, the lower plate (32; Figure 12b; column 11, lines 4-40) having a substantially circular shape, the lower plate (32; Figure 12b; column 11, lines 4-40) including a circumferential edge (25b,c1,b,c2,b,c3; Figure 10; column 10, lines 21-45) that consists of a first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), wherein a total number of coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and a total number of coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are both even numbers, half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are alternately arranged along the first semicircular portion (25b1,b2,b3; Figure 10; column 10, lines 21-45), the other half of the coolant inlets (25b1,b2,b3; Figure 10; column 10, lines 21-45) and the other half of the coolant outlets (25c1,c2,c3; Figure 10; column 10, lines 21-45) are alternately arranged along the second semicircular portion (25c1,c2,c3; Figure 10; column 10, lines 21-45), and the cooling lines (B,B'; Figure 10; column 10, lines 21-45) are arranged such that they are parallel to one another, as claimed by claim 26

xi. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is formed of a heat-resistant material, as claimed by claim 32

xii. The apparatus (Figure 7; column 7, lines 1-40) of claim 32, wherein the heat-resistant material is a ceramic material, as claimed by claim 33

xiii. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, wherein the separating device (not numbered; Figure 7 - elements immediately above 17) is ring shaped and is configured to abut a bottom surface of the heater stage (3,4; Figure 7; column 7, lines 1-40), as claimed by claim 34

xiv. The apparatus (Figure 7; column 7, lines 1-40) of claim 35, wherein the shaft introduction portion (17, 18; Figure 7) comprises a flexible bellows wall having a variable length depending on the raising and lower (32; Figure 12b; column 11, lines 4-40)ing of the shaft (not numbered; Figure 7), as claimed by claim 36

xv. The apparatus (Figure 7; column 7, lines 1-40) of claim 27, further comprising a process chamber (1; Figure 7; column 7, lines 1-40) cooling system arranged in thermal communication with a lower (32; Figure 12b; column 11, lines 4-40) portion of the process chamber (1; Figure 7; column 7, lines 1-40), said lower (32; Figure 12b; column 11, lines 4-40) portion of the process chamber (1; Figure 7; column 7, lines 1-40) supporting the separating device (not numbered; Figure 7 - elements immediately above 17), as claimed by claim 37

Tomoyasu teaches a wafer processing apparatus (Figure 18) including:

i. a separating device (527; Figure 18) disposed beneath the heater stage (526; Figure 18), a lower surface of the separating device (527; Figure 18) disposed in contact with the bottom wall (546; Figure 18), the separating device (527; Figure 18) configured to separate the heater stage (526; Figure 18) from the bottom wall (546; Figure 18) and to reduce a volume of processing space within the process chamber (502; Figure 18): and a process chamber (502; Figure 18) cooling system (521; Figure 18) configured to cool a bottom surface of the process chamber (502; Figure 18) whereon the separating device (527; Figure 18) is located - claim 19

ii. The apparatus (Figure 7; column 7, lines 1-40) of claim 19, wherein the separating device (527; Figure 18) comprises a heat-resistant material ("heat insulating wall"; column 14; lines 13-21) - claim 14

iii. the separating device (527; Figure 18) is ring shaped, the upper surface of the separating device (527; Figure 18) configured to abut a lower surface of the heater stage (526; Figure 18), a substantial portion of the upper surface of the separating device (527; Figure 18) disposed directly beneath the lower surface of the heater stage (526; Figure 18) - claim 16

iv. a shaft introduction portion (544, 547; Figure 18) is formed as a flexible bellows (547; Figure 18) and has a length that varies as the shaft (544; Figure 18) is raised and lowered - claim 18

v. the separating device (527; Figure 18) is ring shaped and is configured to abut a bottom surface of the heater stage (526; Figure 18) - claim 34

vi. the shaft introduction portion (544, 547; Figure 18) comprises a flexible bellows (547; Figure 18) wall having a variable length depending on the raising and lower (32; Figure 12b; column 11, lines 4-40)ing of the shaft (544; Figure 18) - claim 36

vii. a process chamber (502; Figure 18) cooling system (521; Figure 18) arranged in thermal communication with a lower portion of the process chamber (502; Figure 18), said lower portion of the process chamber (502; Figure 18) supporting the separating device (527; Figure 18), as claimed by claim 37

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Horie's lifting mechanism (17,18; Figure 7) with Tomoyasu's lifting mechanism (544, 547; Figure 18) and adding Tomoyasu's cooling system (521; Figure 18). Further it would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions, inclusive, to use ceramic material parts.

Motivation to replace Horie's lifting mechanism (17,18; Figure 7) with Tomoyasu's lifting mechanism (544, 547; Figure 18) and adding Tomoyasu's cooling system (521; Figure 18) is for influencing wafer temperature control as taught by Tomoyasu (column 10; lines 50-62). Further it would have been obvious to one of ordinary skill in the art at the time the invention was made to reproduce Horie's coolant inlet and coolant outlet parts at optimized relative positions, inclusive, to use ceramic material parts as taught by Tomoyasu (column 10; lines 50-62 – "aluminum nitride"). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04). Additonally, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the

art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

5. Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horie; Kuniaki et al. (US 6132512 A) and Tomoyasu; Masayuki et al. (US 6544380 B2) in view of Chen; Lee et al. (US 4534816 A). Horie and Tomoyasu are discussed above. Horie further teaches Horie's separating device (not numbered; Figure 7 - elements immediately above 17) is disposed inside the process chamber. Horie and Tomoyasu do not teach:

i. The apparatus of claim 19, wherein the process chamber (502; Figure 18) cooling system (521; Figure 18) is disposed outside the process chamber, as claimed by claim 42

ii. the process chamber cooling system (521; Figure 18) is disposed outside the process chamber (502; Figure 18), as claimed by claim 43

Chen teaches a similar wafer processing apparatus (Figure 1) including a cooling system (40) located outside of the process chamber (10).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have added an additional cooling plate to the apparatus of Tomoyasu.

Motivaiton to have added an additional cooling plate to the apparatus of Tomoyasu is for increasing temperature control.

Response to Arguments

6. Applicant's arguments filed February 28, 2008 have been fully considered but they are not persuasive.

Applicant states:

“

For example, FIG. 12B of Horie illustrates wherein disk 31 is spaced apart from disk 32 by disk 30. While a portion of the material gas passage C extends through disk 30 (disposed between disks 31 and 32), such a portion of the material gas passage C does not constitute a gap between disks 31 and 32 because such a portion of the material gas passage C is only present between other portions of the material gas passage C extending through disks 31 and 32. For at least these reasons, Applicants respectfully submit that claim 8 is not rendered obvious by Horie.

“

In response, the Examiner disagrees. In particular, “gaps” are not necessarily voids. The Examiner’s above proposed rejection is still believed to demonstrate that Horie teaches the claimed features.

7. Applicant further states:

“

Further, the heating liquid medium passage B' shown in FIGS. 12B and 12C of Horie are formed in the disk 30 - not in disk 32, which is the lowermost of the disks in the head body 20. For at least this additional reason, Applicants respectfully submit that claim 8 is not rendered obvious by Horie.

“

In response, the Examiner notes that *all* parts 30-32 of Figure 12B define and convey the numerous heating liquid medium passages.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	10/052,703	KANG ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1792	